

CLAIMS:

1. A system for imaging an artery contained in an arterial tree, the artery having an axis, comprising:
 - a a microprocessor configured to
 - 5 aa generate a three-dimensional reconstruction of the arterial tree from two or more angiographic images of the arterial tree obtained from different perspectives;
 - ab determine an orientation of the axis of the artery in the arterial tree;
 - 10 ac determine from the three-dimensional reconstruction of the arterial tree at least one perspective of the artery perpendicular to the axis of the artery; and
 - ad generate a three dimensional reconstruction of the artery from angiographic images obtained essentially from the determined at least one
15 perspective.
2. The system of Claim 1 wherein the microprocessor is further configured to display on a display any one or more of an angiographic image, the reconstruction of the arterial tree, or the reconstruction of the artery.
3. The system of Claim 2 further comprising a display configured to display any
20 one or more of an angiographic image, the reconstruction of the arterial tree, or the reconstruction of the artery.
4. The system of Claim 1 wherein the microprocessor is further configured to make meterological measurements on the reconstruction of the arterial tree or the reconstruction of the artery.
- 25 5. The system according to Claim 3 wherein the microprocessor is further configured to manipulate an image on the display.
6. The system of Claim 3 wherein the microprocessor is configured to display on the display a view of the three-dimensional reconstruction of the arterial tree from a selected perspective.

7. The system of Claim 3 wherein the microprocessor is configured to display on the display a view of the three-dimensional reconstruction of the artery from a selected perspective, such as a cross sectional perspective.

8. The system of Claim 3 wherein the three-dimensional reconstruction of the artery is displayed on the display embedded in the three-dimensional display of the arterial tree.

9. A method for imaging an artery contained in an arterial tree, the artery having an axis, comprising:

a generating a three-dimensional reconstruction of the arterial tree from two or more angiographic images of the arterial tree obtained from different perspectives;

b determining an orientation of the axis of the artery in the arterial tree;

c determining from the three-dimensional reconstruction of the arterial tree at least one perspective of the artery perpendicular to the axis of the artery; and

d generating a three dimensional reconstruction of the artery from angiographic images obtained essentially from the determined at least one perspective.

10. The method of Claim 9 further comprising a step of displaying on a display any one or more of an angiographic image, the reconstruction of the arterial tree, or the reconstruction of the artery.

11. The method of Claim 9 further comprising a step of making meterological measurements on the reconstruction of the arterial tree or the reconstruction of the artery.

12. The method according to Claim 10 further comprising a step of manipulating an image on the display.

13. The method of Claim 10 further comprising a step of displaying a view of the three-dimensional reconstruction of the arterial tree from a selected perspective.

14. The method of Claim 10 further comprising a step of displaying on the display a view of the three-dimensional reconstruction of the artery from a selected perspective, such as a cross sectional perspective.

15. The method of Claim 14 wherein the three-dimensional reconstruction of the artery is displayed on the display embedded in the three-dimensional display of the arterial tree.

16. A method for diagnosing stenosis in an arterial tree in an individual comprising

a generating a three-dimensional reconstruction of the arterial tree from two or more angiographic images of the arterial tree obtained from different perspectives;

b detecting in the three-dimensional reconstruction of the arterial tree a stenotic artery, the stenotic artery having an axis;

c determining an orientation of the axis of the stenotic artery;

d determining from the three-dimensional reconstruction of the arterial tree at least one perspective of the stenotic artery perpendicular to the axis of the artery;

e generating a three dimensional reconstruction of the artery from angiographic images obtained essentially from the determined at least one perspective; and

f analyzing the three-dimensional reconstruction of the artery.

17. The method according to Claim 16 wherein the step of analyzing the three-dimensional reconstruction of the artery includes determining the length or severity of the stenosis in the stenotic artery.

18. The method according to Claim 16 or 17 wherein the arterial tree is selected from the group comprising the coronary arterial tree, the renal arterial tree, the pulmonary arterial tree, the cerebral arterial tree, and the hepatic arterial tree.

19. The method according to Claim 17 wherein the stenotic artery has a lumen, the lumen has a cross-section of maximal narrowing, the cross-section of maximal narrowing has a fraction occluded by plaque, and determining the severity of the

stenosis includes determining the fraction of the cross-section of maximal narrowing occluded by plaque.

20. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for
5 imaging an artery contained in an arterial tree, the artery having an axis, comprising:

a generating a three-dimensional reconstruction of the arterial tree from two or more angiographic images of the arterial tree obtained from different perspectives;

10 b determining an orientation of the axis of the artery in the arterial tree;

c determining from the three-dimensional reconstruction of the arterial tree at least one perspective of the artery perpendicular to the axis of the artery; and

15 d generating a three dimensional reconstruction of the artery from angiographic images obtained essentially from the determined at least one perspective.

21. A computer program product comprising a computer useable medium having computer readable program code embodied therein for imaging an artery
20 contained in an arterial tree, the artery having an axis, the computer program product comprising

a computer readable program code for causing the computer to generate a three-dimensional reconstruction of the arterial tree from two or more angiographic images of the arterial tree obtained from different perspectives;

25 b computer readable program code for causing the computer to determining an orientation of the axis of the artery in the arterial tree;

c computer readable program code for causing the computer to determine from the three-dimensional reconstruction of the arterial tree at least one perspective of the artery perpendicular to the axis of the artery; and

d computer readable program code for causing the computer to generate a three dimensional reconstruction of the artery from angiographic images obtained essentially from the determined at least one perspective.

22. A program storage device readable by machine, tangibly embodying a program
5 of instructions executable by the machine to perform method steps for diagnosing stenosis in an arterial tree in an individual comprising

a generating a three-dimensional reconstruction of the arterial tree from two or more angiographic images of the arterial tree obtained from different perspectives;

10 **b** detecting in the three-dimensional reconstruction of the arterial tree a stenotic artery, the stenotic artery having an axis;

c determining an orientation of the axis of the stenotic artery;

d determining from the three-dimensional reconstruction of the arterial tree at least one perspective of the stenotic artery perpendicular to the axis
15 of the artery;

e generating a three dimensional reconstruction of the artery from angiographic images obtained essentially from the determined at least one perspective; and

f analyzing the three-dimensional reconstruction of the artery.

20 **23.** A computer program product comprising a computer useable medium having computer readable program code embodied therein for diagnosing stenosis in an arterial tree in an individual the computer program product comprising:

a computer readable program code for causing the computer to generate a three-dimensional reconstruction of the arterial tree from two or more
25 angiographic images of the arterial tree obtained from different perspectives;

b computer readable program code for causing the computer to detect in the three-dimensional reconstruction of the arterial tree a stenotic artery, the stenotic artery having an axis;

c computer readable program code for causing the computer to
30 determine an orientation of the axis of the stenotic artery;

d computer readable program code for causing the computer to determine from the three-dimensional reconstruction of the arterial tree at least one perspective of the stenotic artery perpendicular to the axis of the artery;

e computer readable program code for causing the computer to generate
5 a three dimensional reconstruction of the artery from angiographic images obtained essentially from the determined at least one perspective; and

f computer readable program code for causing the computer to analyze the three-dimensional reconstruction of the artery.